

**The Western Palaearctic species of *Stenomicro* Coquillett (Diptera, Perisclididae, Stenomicroinae), with description of a new species of the subgenus *Podocera* Czerny**

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**The Western Palaearctic species of *Stenomicro* Coquillett (Diptera, Perisclididae, Stenomicroinae), with description of a new species of the subgenus *Podocera* Czerny.** - *Stenomicro* (*Podocera*) *soniae* sp. n. is described from Central and Southeast Europe, and compared with morphologically similar species. The type material of *Stenomicro* (*Podocera*) *delicata* (Collin, 1944) is revised and the species redescribed. Both European species of *Podocera* Czerny are illustrated and their biology and distribution reviewed with a number of new records. A key to the four Western Palaearctic species of *Stenomicro* is presented.

**Keywords:** Perisclididae - *Stenomicro* (*Podocera*) - new species - Western Palaearctic.

## INTRODUCTION

The systematic position of *Stenomicro* Coquillett was for a long time subject to controversial opinions since Coquillett (1900) originally placed it in the Drosophilidae. The genus was later included in the Anthomyzidae (Collin, 1944; Sabrosky, 1965), Asteiidae (Malloch, 1927), Aulacigastridae (Hennig, 1971; Sabrosky, 1975; Cogan, 1976; Irwin, 1982; Teskey, 1987) or treated as separate family, Stenomicroidae (Roháček, 1983, 1987, 1997; Papp, 1984, 2001; Khoo & Sabrosky, 1989; Andersson, 1991; Tschirnhaus, 1992; Bächli, 1997, 1998; Chandler, 1998; Roháček & Barták, 2001; Merz, 2002; Drake, 2004). McAlpine (1978) provisionally referred the genus to the Perisclididae. This proposition is now widely accepted, often with subfamilial status given to the group (Grimaldi & Mathis, 1993; Mathis & Papp, 1998; Tschirnhaus, 1999; Freidberg & Mathis, 2002) and is therefore adopted in the present paper.

Sabrosky (1975) proposed that *Stenomicro* may be divided into two well-distinguished subgenera, *Stenomicro* s. str. and *Podocera* Czerny, 1929, and this division was followed by subsequent workers (Papp, 1984; Freidberg & Mathis, 2002). Chandler (1998) suggested, however, that *Podocera* Czerny is preoccupied by *Podocera*

*cera* Latreille, 1817. The latter spelling (*Podocera*, Latreille, 1817) must be considered an incorrect subsequent spelling of *Podocerus* Leach, 1814, to which Latreille explicitly refers. For this reason the name *Podocera* Latreille does not fall within the rules of the Code and *Podocera* Czerny is the valid genus-group name (ICZN, Articles 33.3 and 33.5).

Very little is known about the biology of *Stenomicroa*. According to Williams (1939), larvae of a Hawaiian species were found in water-holding leaf bases of several monocotyledones. Adults of *S. delicata* (Collin, 1944) were collected on vegetation in an old empty pond (Collin, 1944) and subsequently recorded to be closely associated with tussocks of large *Carex* species (Howe & Howe, 2001; Howe *et al.*, 2001; Drake 2004). *Stenomicroa cogani* Irwin, 1982, was originally found in vegetation beside a small lake (Irwin, 1982), later collected in bogs and marshes from large stands of *Carex paniculata* (Howe & Howe, 2001), *Typha* (Merz, 2002), large *Carex* spp. [*C. paniculata*, *C. elata*, *C. rostrata*, *C. acutiformis* (Drake, 2004)], and on large *Carex* in a water pond in Northern Italy (Merz, unpublished observation). Freidberg & Mathis (2002) described *S. jordanensis* from specimens swept on *Cyperus*. These observations suggest that most *Stenomicroa* may be associated with grass-like monocotyledones in wetland habitats and may be either phytophagous or saprophagous.

*Stenomicroa* has an almost world-wide distribution, with about 20 extant species described from all biogeographical regions (Freidberg & Mathis, 2002) and two fossil species from Dominican Amber (Grimaldi & Mathis, 1993). However, according to Freidberg & Mathis (2002) over 100 species from the Neotropical Region await description. About 10 undescribed species are deposited in the collection of the "Muséum d'histoire naturelle, Genève", mainly from the Oriental and Australasian Regions. Evidently, these tiny flies are still very incompletely studied. Collin (1944) described the first species, *S. delicata*, occurring in the Western Palaearctic Region. Later, Irwin (1982) added a species from Wales, and Freidberg & Mathis (2002) a species from Israel. Andersson (1991) mentioned two probably undescribed species from Sweden but he did not describe them.

During a recent field trip near Geneva three specimens of a *Stenomicroa* (*Podocera*) were collected by beating tussocks of *Carex*. Their identification showed that previous records of *S. delicata* from Switzerland (Bächli, 1997, 1998), Czech Republic (Roháček, 1995a, 1997; Roháček & Barták, 2001) and Slovakia (Papp, 1978; Roháček, 1983, 1986, 1987, 1995b, 1997) were misidentifications and refer to a hitherto undescribed species. To clear up the morphological limits of the two Western Palaearctic species of the subgenus *Podocera* a key and detailed descriptions of both species are presented below.

## MATERIAL AND METHODS

The material which was studied in this paper is deposited in the following collections:

- BUB Fakultät für Biologie, Universität Bielefeld, Germany
- HNHM Hungarian Natural History Museum, Budapest, Hungary
- MHNG Muséum d'histoire naturelle, Genève, Switzerland

- SMO Silesian Museum, Opava, Czech Republic  
 TAU Entomological collection of the Tel-Aviv University, Tel-Aviv, Israel  
 UMO Hope Entomological Collections, University Museum, Oxford, Great Britain  
 CGB private collection G. Bächli, Dietikon, Switzerland  
 CMB private collection M. Barták, Praha, Czech Republic

In the "Material" section the Swiss cantons are indicated according to the official abbreviations: GE = Genève, JU = Jura, TI = Ticino, VS = Valais, ZH = Zürich. Terminology of morphological structures follow the first chapters in Papp & Darvas (2000) and Freidberg & Mathis (2002). Structures of antennae are according to Stuckenberg (1999). Abdominal sternites and tergites are abbreviated as "S" and "T" respectively in the descriptions.

KEY TO WESTERN PALAEARCTIC SPECIES OF *STENOMICRA* COQUILLET, 1900

- 1 Costal section between apices of veins R2+3 and R4+5 at least 3 times as long as section between R4+5 and M1+2 (Fig. 29); anterior fronto-orbital seta much smaller and shorter than posterior fronto-orbital seta, usually reclinate . . . . . subgenus *Stenomicra* s. str. 2  
 - Costal section between apices of veins R2+3 and R4+5 shorter or about as long as section between R4+5 and M1+2 (Figs 4, 17); both fronto-orbital setae subequal in length and strength, anterior seta usually inclinate (Figs 1, 2, 13, 14) . . . . . subgenus *Podocera* 3  
 2 Posterior crossvein (DM-Cu) absent; body almost entirely yellow (Fig. 28) . . . . . *S. cogani* Irwin, 1982  
 - Both crossveins present; body yellow with longitudinal black vittae on scutum (laterally of line of dorsocentral setae), pleurae (anepisternum and katepisternum, Fig. 29), scutellum (laterally at base) and abdomen (paired spots on T 3 and 4, see Freidberg & Mathis, 2002, Fig. 2) . . . . . *S. jordanensis* Freidberg & Mathis, 2002  
 3 Wing (Fig. 4) without alula, CuA2 developed as a fold (cell cup partly closed); base with broad milky white crossband; pterostigma brown, distally uniformly hyaline; no gap between last two dorsocentral setae (Fig. 25); all femora and tibiae uniformly yellow (Fig. 24); basal two abdominal tergites ivory yellow, remaining tergites orange-yellow to pale brown (T 3 and 4); surstylus bilobate (Figs 8, 12); two bare, asymmetric pregonites present (Figs 10, 11); only left postgonite developed (Fig. 10) . . . . . *S. delicata* (Collin, 1944)  
 - Wing with a small alula, without trace of CuA2 (cell cup open); surface uniformly hyaline, but base of wing with very narrow milky white crossband and both crossveins bordered with milky frame (Fig. 17); last two dorsocentral setae separated by a distinct gap (Fig. 27); hind femur and hind tibia each with a black ring (Fig. 26); abdomen more or less uniformly brown; surstylus simple (Figs 20, 23); only right pregonite present, covered with small tubercles (Figs 19, 22); two rather large postgonites developed (Fig. 22) . . . . . *S. soniae* sp. n.

## TAXONOMIC PART

*Stenomicra* Coquillett

*Stenomicra* Coquillett, 1900: 262. Type species: *Stenomicra angustata* Coquillett, by original designation.

Subgenus *Podocera* Czerny

*Podocera* Czerny, 1929: 93. Type species: *Podocera ramifera* Czerny, by original designation. Synonymy and subgeneric status with *Stenomicra* by Hendel, 1931: 10.

*Neoscaptomyza* Séguy, 1938: 347. Type species: *Neoscaptomyza bicolor* Séguy, by original designation. Synonymy with *Stenomicra* (*Podocera*) by Sabrosky, 1975: 664.

*Diadelops* Collin, 1944: 265. Type species: *Diadelops delicata* Collin, by original designation. Synonymy with *Stenomicra* s. lat. by Sturtevant, 1954: 560. Synonymy with *Podocera* by Irwin, 1982: 235.

*Stenomicra* (*Podocera*) *delicata* (Collin)

Figs 1-12, 24-25

*Diadelops delicata* Collin, 1944: 266.

*Stenomicra delicata*: Sabrosky, 1965: 211; Howe & Howe, 2001:48; Howe *et al.*, 2001: 148; Drake, 2004: 3.

*Stenomicra* (*Podocera*) *delicata*: Irwin, 1982: 235; Papp, 1984: 62; Tschirnhaus, 1999: 171.

*Stenomicra* (*Diadelops*) *delicata*: Chandler, 1998: 142.

## TYPE MATERIAL

Lectotype ♂ (here designated), **Great Britain**: “S. L. [= Sussex Lodge], Nmkt. [= Newmarket], dry pond, 11.7.43 [= 11.VII.1943]”, “VC-Type 645, *Diadelops, delicata* Collin ♀” (UMO). Paralectotypes: 1 ♀, same data; 1 ♀, same data, but 5.VII.1942; 1 ♀, same data, but 1.VII.1942; 1 ♂, same data, but 19.VII.1942 (all UMO).

This species was described based on 4♂♂, 5♀♀ all from the same locality (Collin, 1944; Pont, 1995). Of these, the above listed 2♂♂ and 3♀♀ could be examined. The male which is herewith selected as lectotype is pinned on a minuten pin, in good condition with few setae on the head missing and with the minuten pin obscuring some setulae on the scutum. The other male was dissected. Its terminalia agree with Figs 1-12.

## ADDITIONAL MATERIAL (5 specimens)

**Germany**: 1♂, NW [= Nordrhein-Westfalen], Bielefeld, Hohberge, 30.VI.1992, F. Püchel (BUB). 1♀, SH [= Schleswig-Holstein], Kreis Plön, Trentmoor, between Preetz and Plön, 23.IV.1993, Malaise trap, Kassebeer (BUB).

**Switzerland**: 1♂, 2♀♀, GE, Jussy, Prés de Villette, 475 m, 18.V.2004, B. Merz (MHNG).

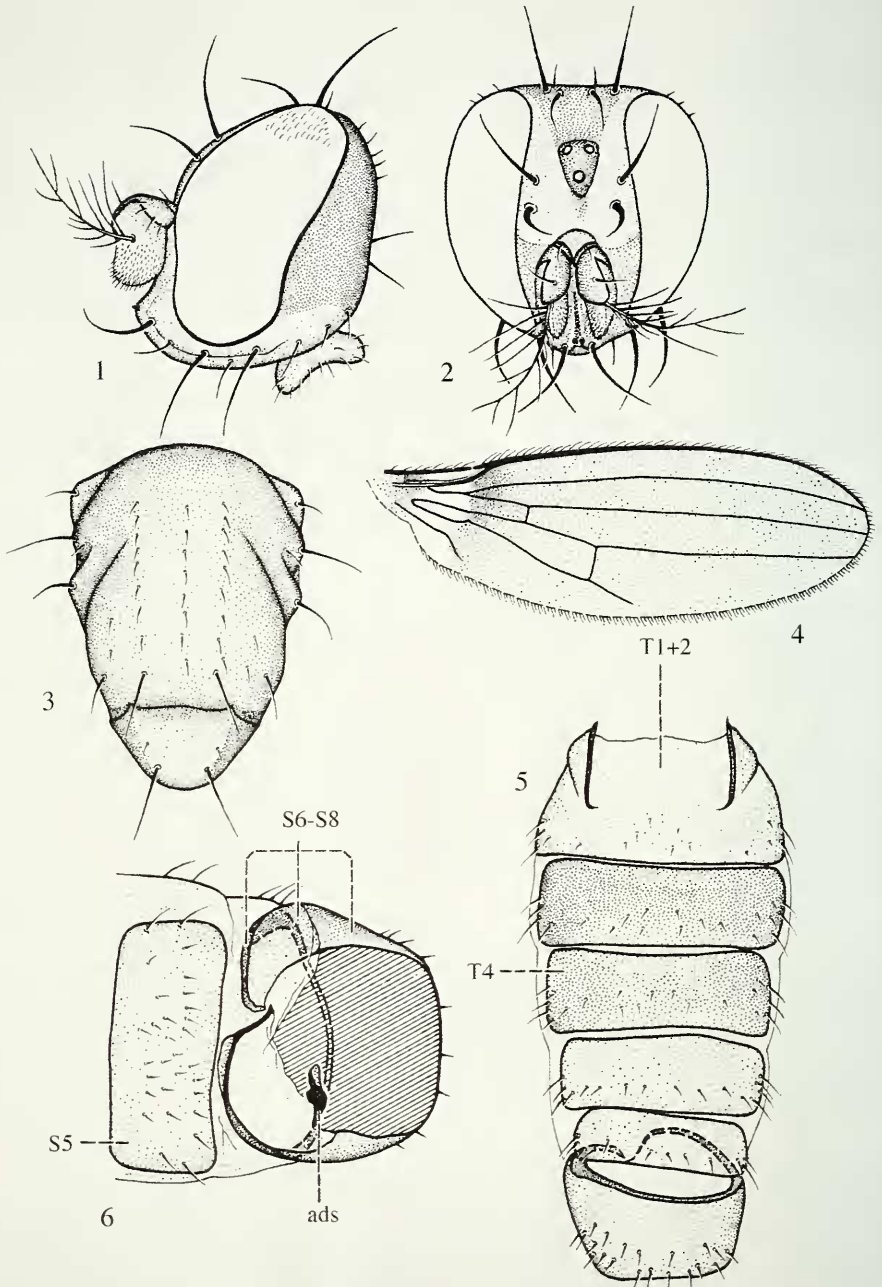
## DIAGNOSIS

This is a very small, slender species (wing length less than 2 mm) which can be distinguished from the other, more robust Western Palearctic species of *Podocera* (*S. soniae*) by the absence of an alula, but the presence of a faint CuA2 (cell cup therefore partly closed); the broad white crossband at wing base with brown pterostigma, remaining wing surface uniformly hyaline; the grey thorax including scutellum but ventral half of pleura yellow (Figs 24, 25); all femora and tibiae entirely yellow; the basal two abdominal tergites ivory yellow, the remaining tergites orange-yellow to pale brown, and very different male terminalia. Further differences are given in Tab. 1.



TABLE 1. Comparison of morphology of *Stenomicra delicata* (Collin, 1944) and *S. somiae* sp. n. Abbreviations: A = Abdomen; G = Genitalia (male); H = Head; L = Legs; T = Thorax; W = Wing.

Character	<i>S. delicata</i> (Collin)	<i>S. somiae</i> sp. n.
H: small postocellar setae on occiput	present (Fig. 2)	absent (Fig. 14)
H: frons	higher than wide (Fig. 2)	wider than high (Fig. 14)
T: colour scutellum	uniformly grey	grey, apically yellow
T: colour anepisternum	dorsally grey, ventrally yellow	uniformly grey
T: dorsocentral setae	only last dorsocentral seta longer, not separated by a gap (Fig. 3)	last two dorsocentral setae long, separated by broad gap (Fig. 16)
W: length : width ratio	3:1 (Fig. 4)	2.7:1 (Fig. 17)
W: alula	absent	small, but distinct (Fig. 17)
W: base	with broad milky-white crossband (Fig. 4)	very narrow milky-white crossband (Fig. 17)
W: distal margin of anal cell	faint, convex crossvein (Fig. 4)	no trace of crossvein (Fig. 17)
W: crossveins (R-M; DM-Cu)	uniformly hyaline as rest of wing (Fig. 4)	bordered by milky-white frame (Fig. 17)
W: knob of halter	white	brown to black (specimens in alcohol: very pale)
L: colour hind femur and tibia	uniformly yellow	apical third of femur and basal third of tibiae with black ring
A: colour	basal two tergites ivory-yellow, posterior tergites orange-yellow to pale brown	uniformly brown
G: <i>Sturstylus</i>	apically bilobate (Fig. 12)	apically simple (Fig. 23)
G: <i>pregonite</i>	2 asymmetric present, both bare (Figs 10, 11)	only right present, rugulose (Fig. 22)
G: <i>postgonite</i>	only left present, small (Fig. 10)	2 asymmetric present (Fig. 22)
G: <i>Phallopodeme</i>	stout (Fig. 9)	slender (Fig. 21)



FIGS 1-6

*Stenomicra (Podocera) delicata* (Collin). 1, head laterally; 2, head dorsofrontally; 3, thorax dorsally; 4, wing; 5, abdomen dorsally; 6, postabdomen + 5th sternum ventrally (genitalia omitted). Abbreviations: ads = additional sclerite; S = Sternite; T = Tergite. (Del. J. Roháček)

## DESCRIPTION OF MALE

*Wing length.* 1.60 mm. *Body length:* 1.3 mm (1.25-1.5 mm according to Collin, 1944).

*Head* (Figs 1-2). Yellow, but thinly ash-grey microtrichose on posterior part of frons and partly on occiput posterior of compound eye; compound eye with short, but distinct interfacetal setulae; form as in *S. soniae*; frons bare, parallel-sided, about 1.35 times as high as wide; ocellar triangle slightly raised, in the middle of frons; face as in *S. soniae*, the pair of small sensillae medially more closely together; antenna as in *S. soniae*; arista large, plumose, rays much longer than diameter of postpedicel, dorsally with 5, ventrally with 3 long rays; mouthparts as in *S. soniae*. Chaetotaxy: colour of major setae and setulae yellow to brown depending on viewing angle and illumination; 2 subequal fronto-orbital setae in anterior half of frons, anterior fronto-orbital seta proclinate and inclinate, posterior fronto-orbital seta reclinate; 1 long, latero-clinate medial vertical seta; anteromedially with 1 slightly shorter, proclinate pseudopostocellar seta; dorsally of pseudopostocellar seta with 1 very short, upright postocellar seta on occiput; no ocellar seta; 1 porrect, latero-clinate and slightly dorso-clinate pseudovibrissa; ventrally of them with 1 short, dorso-clinate seta and with 2 long and 3 short ventro-clinate genal setae.

*Thorax* (Fig. 3). Ground colour yellow, but scutum, scutellum, subscutellum and dorsal half of pleura to a line of middle of anepisternum and base of halter thinly ash grey microtrichose. Chaetotaxy: colour of setae and setulae as on head; 5 minute acrostichal setulae in 1 row in anterior half of scutum; 1 strong posterior dorso-central seta and 7-8 much shorter setulae anterior in 1 line, without gap between last two setae; 1 short postpronotal seta; 2 stronger subequal notopleural setae; 1 postalar seta; 2 minute setulae dorsally of notopleuron anterior of suture; 1-2 minute postsutural intraalar setulae; scutellum with 1 apical scutellar seta and 1 minute dorsolateral setula; 1 katepisternal seta.

*Wing* (Fig. 4). Rather elongate, maximal length:width ratio 3:1; alula absent; vein CuA2 present as fold, convex, below better developed, other venation as in *S. soniae*; ratios on C: section 2/3 (distance between R1 and R2+3/R3+3 and R4+5) about 18; section 3/4 (distance between R2+3 and R4+5/R4+5 and M) about 0.85. Last section on M (DM-Cu to tip) about 3 times as long as distance between crossveins. Halter white; squamae yellow, small.

*Legs.* Entirely yellow, only last tarsal segment of fore and mid leg blackish, and apical third of last hind tarsomere slightly brownish; fore femur with 2 posteroventral brown setae; mid tibia with one brown, ventral apical seta.

*Abdomen* (Figs 5-6). Tergites 1+2 ivory-yellowish, remaining tergites of yellow ground colour, but with badly delimited brown patches, T3 and T4 darkest, T5 and T6 distinctly paler. T3-T6 less transverse and narrower than those of *S. soniae* (Fig. 5). T6 well developed, relatively long (twice as long as in *S. soniae*). Sternites large, pale yellow; S1 short, transverse and wider than S2; S2-S5 becoming wider posteriorly, subequal in length or S5 slightly shorter. Abdominal spiracles strongly reduced, hardly visible. Postabdominal sclerites (S6-S8, see Fig. 6) fused to asymmetrical complex, markedly longer than in *S. soniae*, but similarly shaped. Strip-shaped marginal part belonging to S6 and stripe-like ventral projection of right anterior corner of S8 meeting

(Fig. 6) on ventral side. Additional sclerite (Fig. 6) on right side behind S6-S8 complex larger and darker brown than that of *S. soniae*, somewhat resembling a head of mattock.

*Male genitalia* (Figs 7-12). Epandrium (Figs 7, 8) orange yellow, distinctly higher than long, shortened ventrally and less broad than that of *S. soniae* but with similar setosity including 3 anteroventral setae on each side. Anal fissure broad but cerci smaller and closer each to other than those of *S. soniae*. Surstylus (Figs 8, 12) normally so strongly bent inside (inclined) that almost invisible in lateral view (and therefore omitted in Fig. 7; in Fig. 8 the surstylus is somewhat unnaturally straightened); in widest extension view (Fig. 12) more slender than in *S. soniae* with dilated and densely micropubescent proximal third, slender middle part and widened distal third provided with 2 distinct teeth. Bacilliform sclerite formed by two separate and setose sclerites (Figs 7, 8), more slender than in *S. soniae*. Hypandrium (Figs 7, 10, 11) similarly formed as in *S. soniae* but both its lateral parts provided with robust anteroventral appendages (? pregonites) being different on left (having apical and ventral preapical tooth, Fig. 10) and right (simply apically pointed, Fig. 11) sides. Aedeagal complex asymmetrical, with only left postgonite developed (Fig. 10) though small and weakly sclerotized (right postgonite absent in contrast to large one in *S. soniae*). Basiphallus (Fig. 9) more robust than in *S. soniae*, with short and blunt epiphallus and with richly microsetulose ventrolateral lobes. Distiphallus similarly armed as that of *S. soniae*, but apical processes (including preapical sclerite) smaller and differently shaped (Fig. 9). Phallapodeme (Fig. 9) more robust than in *S. soniae*, with strongly bent ventral process. Ejaculatory apodeme (Fig. 7) also thicker than in *S. soniae* with more robust distal part and with smaller dark proximal part.

#### DESCRIPTION OF FEMALE

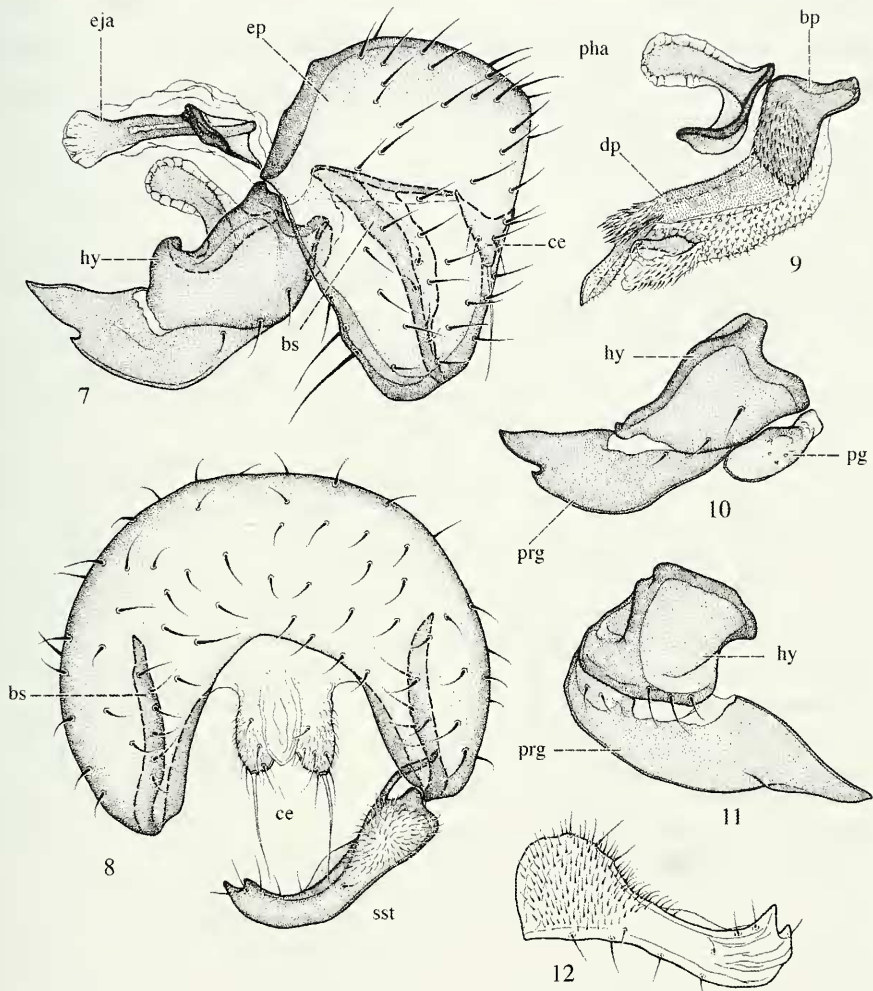
*Wing length.* 1.75-1.95 mm. *Body length:* 1.5 mm.

*Morphology.* As male, but differing in the following points: Head more extensively darkened, with only anterior margin of frons yellow; face medially grey microtrichose; most of occiput and postgena grey microtrichose. Abdominal tergites 3-7 yellow, laterally indistinctly darkened; 2 large, black spermathecae translucent on level of segment 7. Terminalia not dissected.

#### BIOLOGICAL OBSERVATIONS

The specimens from Jussy were collected by holding an insect net under large tussocks of *Carex*, which were beaten and shaken with a wooden stick (= "tussocking", see Drake, 2004). The flies were sitting on dead leaves and did not fly away when approached by an aspirator. In the tubes they were crawling into a piece of paper and did not come out even when shaking the tube. One specimen was observed walking anteriorly, posteriorly and laterally with the same speed, with the head always directed upwards in the net. A similar behaviour was observed by Williams (1939) and Sabrosky (1975). The wings remained closed during these movements. Despite two hours of careful searching at the same place no additional specimens were collected. In England *S. delicata* is closely associated with tussocks of large species of *Carex* (eg. *C. paniculata*, *C. acutiformis*) in both inland and coastal wetlands and may be obtained





FIGS 7-12

*Stenomicra (Podocera) delicata* (Collin), male genitalia (specimen from Germany, Bielefeld). 7, genitalia laterally (surstylus omitted); 8, external genitalia caudally (left surstylus omitted); 9, aedeagal complex laterally (ejaculatory apodeme and postgonite omitted); 10, left side of hypandrial complex with postgonite laterally; 11, right side of hypandrial complex laterally; 12, left surstylus ventrocaudally (widest extension). Abbreviations: bp = basiphallus; bs = bacilliform sclerite; ce = cercus; dp = distiphallus; eja = ejaculatory apodeme; ep = epandrium; hy = hypandrium; pg = postgonite; pha = phallapodeme; prg = pregonite; sst = surstylus. (Del. J. Roháček)

only by beating or suction sampling method (Drake, 2004; P. J. Chandler, J. W. Ismay & B. Schulten, personal communication, 2004).

#### DISTRIBUTION

Described from Great Britain and later found in Germany (Tschirnhaus, 1999) and Switzerland (new record).

*Stenomicro (Podocera) soniae* sp. n.

Figs 13-23, 26-27

*Stenomicro delicata*: Papp, 1978: 198; Bächli, 1997: 34, 1998: 289; Roháček, 1997: 79; Roháček & Barták, 2001: 378. (Misidentifications)

*Stenomicro (Podocera) delicata*: Roháček, 1983: 133, 1986: 146, 1987: 255, 1995a: 173, 1995b: 150. (Misidentifications)

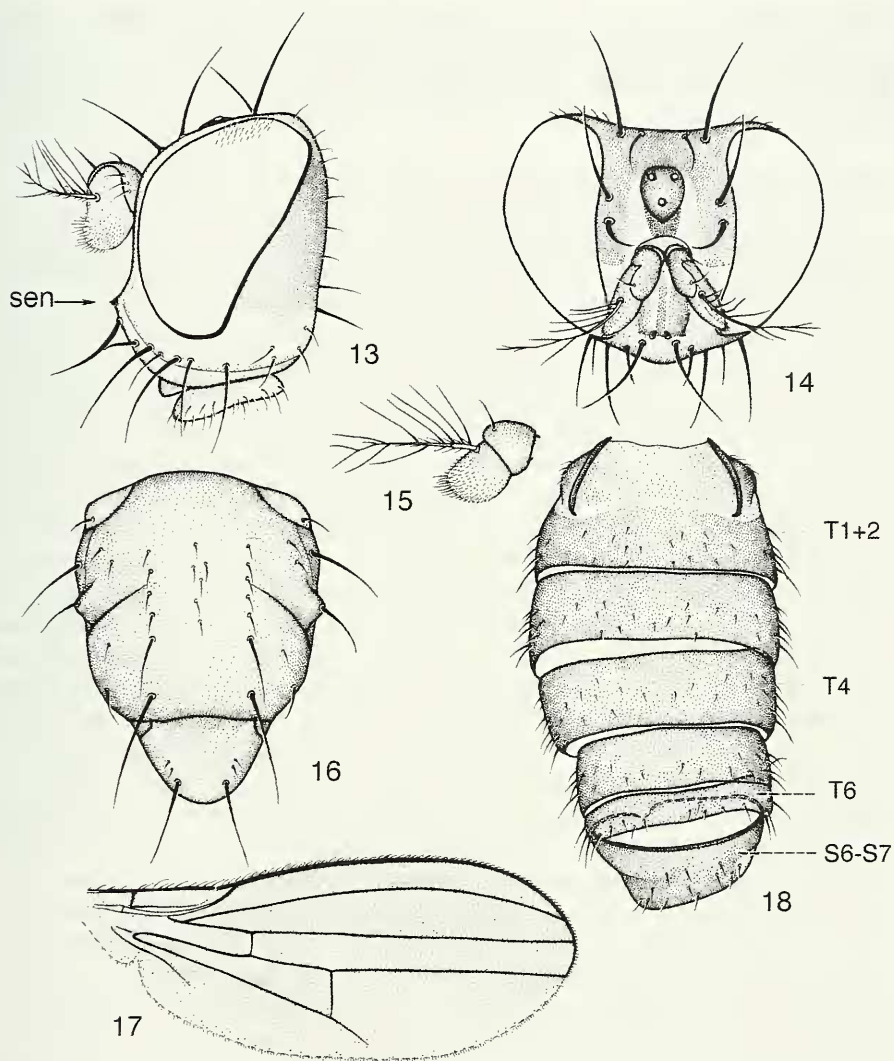
*Stenomicro* sp. n.: Tschirnhaus, 1992: 458.

*Stenomicro* spec.: Buck, 1996: 371.

## MATERIAL (74 specimens)

Holotype ♂, **Czech Republic**: “CS, Kunice-garden, Malaise trap, Barták, 49.56N/14.40E, 430 m, 8-9.VI.1985” (SMO). The holotype is laterally pinned on a cardpoint and is in very good condition.

Paratypes: **Bulgaria**: 1 ♀, Sliven, 13 km N, 42.49N/26.16E, 800 m, damp valley, 21.VII.1987, Barták (CMB). **Czech Republic**: 1 ♀, same data as holotype, but 13-19.VII.1985 (MHNG); 1 ♂, Prostějov-Kunštát, car net, 5.VIII.1992, Barták (SMO); 1 ♀, Duchcov, 50.36.30N/13.43.30E, 220 m, floodplain forest, MT [= Malaise trap], 18.V.-15.VI.1998, Barták (CMB); 1 ♂, same data, but 25.vi.-23.vii.1998, Barták leg. (SMO); 1 ♂, Podyjí NP, Braitava, 48°52'N, 15°49'E, 31.V.-2.VI.2002, mixed wood, car-net, Barták (CMB); 1 ♀, Bohemia, Hradec Králové, 5.VII.1997, Zeman leg. (Museum of East Bohemia, Hradec Králové). **Germany**: 1 ♀, BW [=Baden-Württemberg], Niefern nr. Pforzheim, 13.-22.VI.1992, Malaise-trap, Schmid-Egger (BUB); 3 ♀ ♀, BW, Ravensburg, Bad Waldsee, 16.VI.-15.VII.1995, Eklektor, M. Buck (BUB); 1 ♂, Hessen, Darmstadt, 18.VI.-2.VII.1989, Eklektor, M. Buck (BUB); 1 ♂, NW [= Nordrhein-Westfalen], Bielefeld, Universität, 3.-10.VII.1986, pan trap, M. von Tschirnhaus (BUB); 9 ♀ ♀, NW, Bielefeld, Werther Str., 23.-30.VI.1987, pan traps, M. von Tschirnhaus (BUB, MHNG); 22 ♀ ♀, NW, Bad Lippspringe, 18.VI.1989, B. Robert (BUB, MHNG); 3 ♀ ♀, NW, Köln, Dünnwald, 27.VI.-4.VII.1989, Malaise trap, J. Wehlitz (BUB); 2 ♀ ♀, NW, Köln-Pöhl, 30.V.-6.VI.1989, Malaise trap, J. Wehlitz (MHNG); 1 ♀, same, 27.VI.-4.VII.1989 (BUB); 1 ♀, same, 11.-18.VII.1989 (BUB); 1 ♀, same, 1.-8.VIII.1989 (BUB); 1 ♂, NW, SE Krefeld, Nature Reserve “Die Spey”, 26.V.-2.VI.1990, Malaise trap, Birnbrich *et al.* (BUB); 1 ♀, same, 2.-9.VI.1990 (BUB); 1 ♂, same, 9.-16.VI.1990 (BUB); 1 ♀, same, 16.-24.VI.1990 (BUB); 1 ♂, same, 24.VI.-1.VII.1990 (MHNG); 1 ♂, same, 8.-15.VII.1990 (MHNG); 1 ♂, RP [= Rheinland-Pfalz], Eifel-Gebirge, Kr. Daun, Gönnersdorf, 29.VI.-6.VII.1991, Malaise trap, Cölln & Pompé (BUB); 1 ♀, SH [= Schleswig-Holstein], Kr. Plön, Sieversdorf, Postsee, 22.-29.V.1983, yellow pan trap, M. von Tschirnhaus (BUB). **Romania**: 1 ♀, Carasova, 6 km N, 45.16N/21.53E, flowering meadow, 3.VII.1987, Barták (SMO). **Slovak Republic**: 1 ♀, Slovakia or., Slovensky kras, Zádiel (at light) 15.VI.1981, J. Roháček (SMO); 1 ♀, same, but 16.VI.1981 (SMO); 1 ♀, Slovakia or., Nová Sedlica env. (distr. Humenné), sweeping over boggy meadow, 7.VII.1993, J. Roháček (SMO); 1 ♀, Bártfa [= Bardejov, NE Slovakia], Csergő h. [= Čergov Mts.], 5.VII.1969, Mihályi (HNHM). **Switzerland**: 1 ♀, GE, Geneva, in a glass pavilion, 20.VII.1982, J. Steffen (MHNG); 1 ♀, JU, Delémont, 2-6.VIII.1974, G. Bächli (CGB); 1 ♀, TI, Bolle di Magadino, 17-20.VI.1995, FZ [= Fangzelt], Merz & Bächli (HNHM); 2 ♀ ♀, TI, Gordola, 580-660 m, 1997, M. Moretti (CGB); 1 ♀, VS, Leuk-Pfynwald, 614100/290070, 600m, 7.VI.2001, Merz & Landry (MHNG); 1 ♀, ZH, Embrach-Haumüli, 400 m, 10.VII.1997, B. Merz (MHNG); 1 ♀, ZH, Dietikon, 15-19.VII.1989, G. Bächli (CGB); 1 ♀, ZH, Dietikon, 26.VI.-21.VII.1997, C [= Canopy], G. Bächli (CGB).



FIGS 13-18

*Stenomicra (Podocera) soniae* sp. n. 13, head laterally; 14, head dorsofrontally; 15, antenna laterally (medial side); 16, thorax dorsally; 17, wing; 18, abdomen dorsally. Abbreviations: sen = sensilla; S = Sternite; T = Tergite. (Del. J. Roháček)

## ETYMOLOGY

Named after Mrs Sonia Guyot who supports the scientific work of the senior author in many ways.

## DIAGNOSIS

This species is unmistakable among Western Palearctic *Stenomicra* by the following combination of characters: body mainly ash grey (Figs 26, 27); wing with

small, but distinct alula, cell cup open; hyaline with very narrow milky-white cross-band at base and with both crossveins bordered by a narrow milky-white frame; legs yellow, but mid and hind femora and corresponding tibiae each with black ring; abdomen uniformly brown.

#### DESCRIPTION OF MALE

*Wing length.* 1.75-2.05 mm. *Body length:* 1.4-1.5 mm.

*Head* (Figs 13-15). Ground colour ash-grey, but a narrow stripe along posterior margin of compound eyes, gena and face translucent yellow; antennae and proboscis yellow; compound eye with short, but distinct interfacetal setulae; in lateral view elongate oval, oblique, slightly kidney shaped with posterior margin concave; gena at most one eighth as high as compound eye; frons bare, slightly wider than high, parallel-sided, ocellar triangle slightly raised in the middle of frons; fronto-orbital plate raised; face concave, raised ventrally at vibrissal angle; medially with carina; mediodorsally with a pair of sensillae (very shortened spine-like setae - see Figs 13, 14); antenna (Fig. 15): scape very small, ring-like, with one black dorsal setula; pedicel large, as long as postpedicel, cape-like, apicodorsally with one outstanding black seta, basally with a ring of 5-6 black setulae; postpedicel dorsoapically with a brush of soft, pale setulae; arista black, *Drosophila*-like with long rays which are much longer than width of postpedicel; in addition to apical fork dorsally with 5-6 and ventrally with 2-3 rays; mouthparts: palpus minute, about as long as wide, almost invisible; proboscis not projecting in front of vibrissal angle, with fleshy labellae. Chaetotaxy: colour of major setae paler or darker brown depending on viewing angle and illumination; 2 subequal fronto-orbital setae in anterior half of frons, anterior fronto-orbital seta proclinate and inclinate, posterior fronto-orbital seta reclinate; 1 long, laterocline medial vertical seta; anteromedially with 1 slightly shorter, proclinate pseudopostocellar seta; postocellar seta on occiput dorsally of pseudopostocellar absent; no ocellar seta; 1 porrect, laterocline and slightly dorsocline pseudovibrissa; ventrally with 1 short, dorsocline seta, and with 2 long and 3 short ventrally directed genal setae along mouth margin.

*Thorax* (Fig. 16). Ash-grey microtrichose, but tip of scutellum and ventral part of pleura between coxae yellow. Chaetotaxy: colour of setae and setulae as on head; 5-7 minute acrostichal setulae in 1-2 irregular rows in anterior half of scutum; one row of 5-7 dorsocentral setae, the penultimate much longer than the anterior setulae and separated from the longer and stronger prescutellar dorsocentral seta by a distinct gap; 1 short postpronotal seta; 2 long, subequal notopleural setae; 1 postalar seta; 1-2 minute presutural and 1-2 minute postsutural intraalar setulae; scutellum with 1 apical scutellar seta and with 1-2 small dorsolateral setulae; 1 katepisternal seta, other pleural sclerites bare.

*Wing* (Fig. 17). Less elongate than in *S. delicata*, length/width ratio of 2.7; alula small, but distinct; C reaching M; BM-Cu absent; no trace of CuA<sub>2</sub>, cell cup entirely open; crossveins R-M and DM-Cu present; distance between crossveins 1.5-2 times the length of DM-Cu; R<sub>2</sub>+3 very long and converging towards M near tip; ratios on C: section 2/3 (distance between R<sub>1</sub> and R<sub>2</sub>+3/R<sub>2</sub>+3 and R<sub>4</sub>+5) over 10; section 3 and 4 (distance between R<sub>2</sub>+3 and R<sub>4</sub>+5/R<sub>4</sub>+5 and M) of about same length; last section of M about 2.5 times as long as penultimate section between crossveins; Sc weak,

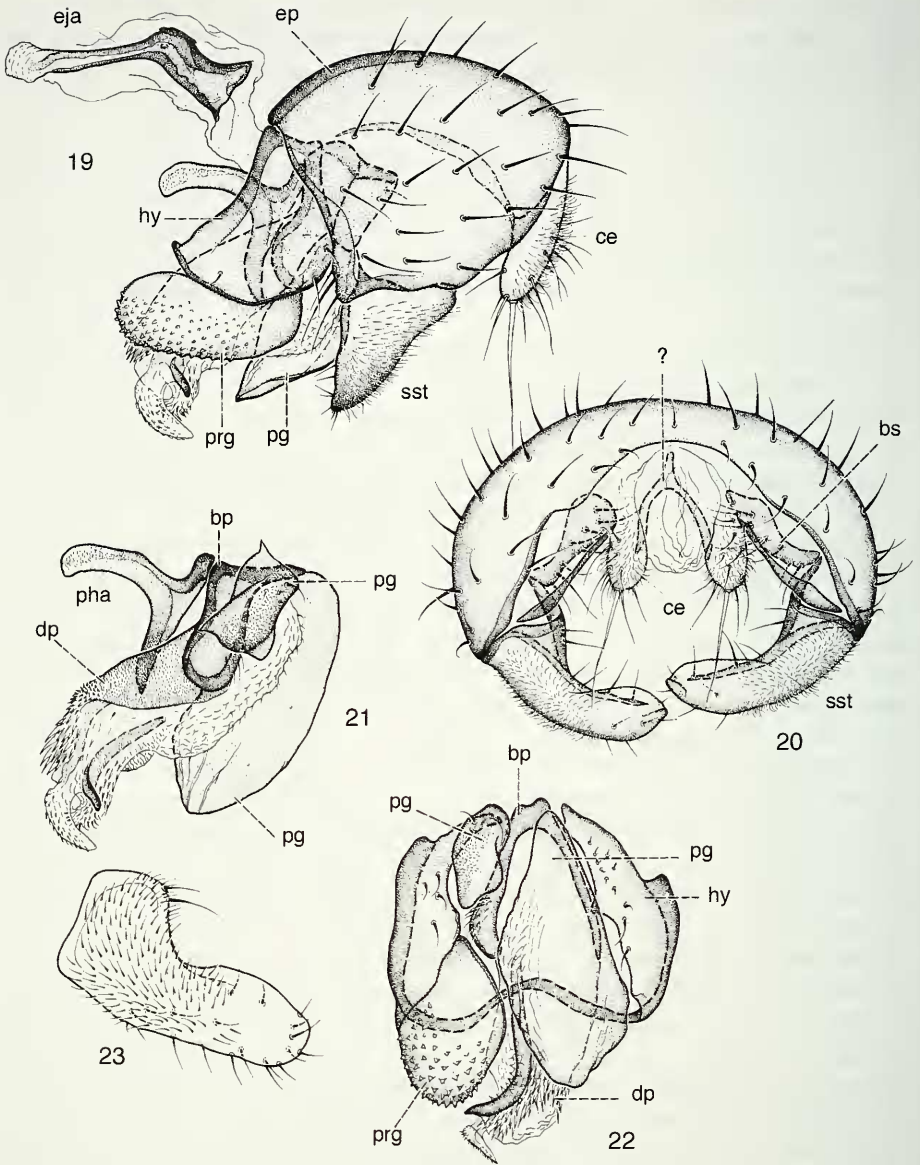


reaching C as fold where the latter has an indistinct break; surface of wing hyaline, but with a milky-white, narrow stripe from node of R2+3 and R4+5 to vein CuA1, and with both crossveins surrounded by milky-white frame. Halter with yellow stem and black knob (but knob usually yellow in specimens in alcohol), squamae small, dark brown, fringe blackish.

*Legs.* Mainly yellow, but apical third of hind femur and basal third of hind tibia each with a distinct, broad black ring; mid femur and mid tibia with indistinct, small brown infuscation around knee; last tarsal segment of front and mid leg blackish, and apical third of last hind tarsomere slightly brownish; fore femur posteroventrally with 2 brown, long setae; mid tibia with one apicoventral brown seta; tibiae without dorsal preapical seta.

*Abdomen* (Fig. 18). Tergites completely brown, T1 medially and T6 somewhat paler. T3-T6 distinctly wider and more transverse than those of *S. delicata*, bent on lateral sides of abdomen; T6 particularly shortened (Fig. 18). Preabdominal sternites S2-S5 large, orange brown. S1 short and transverse, with only lateral parts dark pigmented and looking like divided in 2 small sclerites. S2 longest (distinctly longer than any of other sternites) but narrowest; S3-S5 becoming slightly wider and shorter posteriorly, S5 widest and most transverse. Abdominal spiracles near margins of tergites, strongly reduced. Postabdominal sclerites (S6-S8) forming a fused complex shorter than that of *S. delicata*. S6 reduced to transverse anterior marginal stripe of this complex; part belonging to S7 also small, subtriangular on left side. S8 slightly asymmetrical but its right anterior corner far projecting as strip-like process on ventral side almost to meet S6. There is a small, pointed additional sclerite in membrane on right side behind the latter process.

*Male genitalia* (Figs 19-23). Epandrium relatively long, longer than high and very broad (see Figs 19-20), uniformly shortly setose and with 3 setae in anteroventral corners. Anal fissure broadly semicircular. Cerci well developed, widely separate, each with 1 long apical seta and number of short setae. Surstylus (Figs 19, 20, 23) strongly inclined, in widest extension view (Fig. 23) with simply rounded apex, broader and densely microtrichose in proximal two-thirds of lateral side and with setae mainly concentrated on medial side. Bacilliform sclerite bipartite, not fused medially; each its part movably connected with surstylus and distinctly setose (Fig. 20), anteriorly reaching to posterior margin of hypandrium as also is an Y-shaped slender sclerite attached by its arms to cerci (Fig. 20). Hypandrium (Figs 19, 22) asymmetrically frame-shaped, but posteromedially disconnected; its lateral parts expanded and sparsely setulose, anteromedial part slender and connected with ventral process of phallapodeme; left side of hypandrium anteroventrally provided with a large, suboval, densely tuberculate appendage (? pregonite, see Figs 19, 22) while right side is simple but with more setulae (Fig. 22). Aedeagal complex distinctly asymmetrical (see Figs 21, 22), particularly as regards unevenly developed postgonites, left being small and suboblong (in lateral view), right one very large but pale pigmented, lobe-shaped, with concave inner side and convex outer side. Basiphallus short, inversely V-shaped in caudal view (Fig. 22), with distinct posterodorsal process (epiphallus) and ventrolateral lobes rounded and distinctly microsetulose (on left side – Fig. 21). Distiphallus (Fig. 21) relatively small, ventrally largely membranous, dorsally weakly sclerotized and



FIGS 19-23

*Stenomicra (Podocera) soniae* sp. n., male genitalia (specimen from Germany, Krefeld). 19, genitalia laterally; 22, internal genitalia caudally; 20, external genitalia caudally; 21, aedeagal complex laterally (ejaculatory apodeme omitted); 23, left surstylus ventrolaterally (widest extension). Abbreviations: bp = basiphallus; bs = bacilliform sclerite; ce = cercus; dp = distiphallus; eja = ejaculatory apodeme; ep = epandrium; hy = hypandrium; pg = postgonite; pha = phallopodeme; prg = pregonite; sst = surstylus. (Del. J. Roháček)

micropubescent, with densely spinose apex including a slender, left-curved and pointed sclerite and a small terminal, finely spinulose lobe. Phallapodeme short (Fig. 21), with simple anterior rod and distinct ventral process connected with hypandrium. Ejaculatory apodeme (Fig. 19) larger than phallapodeme, with darker and more robust proximal part and slender anterior rod with expanded but hyaline apex.

#### DESCRIPTION OF FEMALE

*Wing length.* 2.00-2.40 mm. *Body length:* 1.6-2.0 mm.

*Morphology.* As male, but differing in the following points: Head more extensively darkened, with only gena and antennal grooves yellow, but facial carina grey microtrichose; abdominal tergites uniformly brown, posterior margin of tergites 3 and 4 narrowly yellow, posterior tergites slightly darker; sternites orange-brown. Spermathecae not visible externally without dissection. Terminalia not studied.

#### BIOLOGICAL OBSERVATIONS

Almost nothing is known about the biology of *S. soniae*. Tschirnhaus (1992) suggested that larvae may develop in axils of *Angelica silvestris* filled with water. Most specimens were collected with various traps, and only 3 specimens were swept with a net (Tab. 2). It is remarkable that males were almost exclusively collected with Malaise traps, whereas females could be obtained with all methods. The apparent rarity of these flies may be explained by the difficulties in collecting them with the sweeping of vegetation, the most frequently used collecting method. The discovery of a number of specimens collected "in the air" with car nets, window traps and at light is an indication that *S. soniae* is rather vagile, unlike *S. delicata* (see above).

The ecological tolerance of *S. soniae* seems to be much less specific than of the other 3 species of the genus in the Western Palaearctic region that are all associated with a wet environment and the presence of large Cyperaceae (*Carex*, *Cyperus*, see introduction). Only 4 males and 13 females were collected in swampy areas, whereas the other specimens were found in various dry to wet open grassland and in forests (Tab. 3). Even garden vegetation and towns offer suitable habitats for this species with at least 1 male and 8 females caught in these places. This observation gives evidences that *S. soniae* is much more abundant than the material in museums would suggest.

Adults were found from May to August.

TABLE 2. Collecting methods for *Stenomicra soniae* sp. n. Abbreviations for countries: CH = Switzerland; CZ = Czech Republic; GE = Germany; SK = Slovakia.

Method	males	females	origin	depository
Malaise trap	9	13	CZ, GE	BUB, SMO, CMB
pan trap	1	10	GE	BUB
eclector	1	3	GE	BUB
window trap		3	CH	MHNG, CGB
light		2	SK	SMO
car net	1	1	CZ	SMO, CMB
beer trap		1	CH	CGB
banana-yeast trap		1	CH	CGB
sweeping		3	CH, SK	MHNG, SMO
no information		25		



TABLE 3. Habitats for *Stenomicroa soniae* sp. n. Information was taken from unpublished Excel file data from M. von Tschirnhaus (received together with specimens), field book notes of the first author, and label data.

Habitat	males	females
garden, town	1	8
meadows	1	2
pastures	1	9
shrubs	4	6
forests (open, deciduous)	1	9
unknown	4	28

#### DISTRIBUTION

Widely distributed in Central and Southeastern Europe from Northern Germany to Bulgaria.

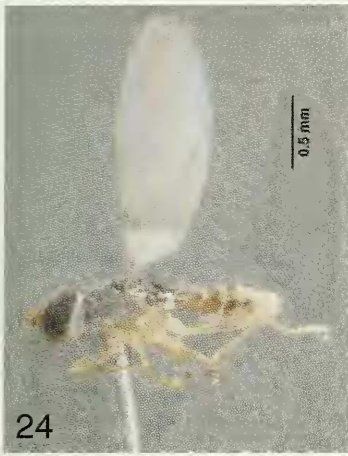
#### AFFINITIES

The following remarks are based on descriptions and illustrations, but not on examination of specimens, except for *S. fascipennis* Malloch (Material studied: 2♂♂, 2♀♀, Japan, Mt. Enaki, Yokohama City, Honshu, 15.VIII.2002, M. Sueyoshi, MHNG). The new species belongs undoubtedly to the subgenus *Podocera* Czerny by the subgeneric characters given in the key above, which is partly taken from Sabrosky (1975) and Freidberg & Mathis (2002). Within the 12 valid species of *Podocera* 5 species have characteristic milky-white crossveins R-M and DM-Cu as in *S. soniae*: *S. fascipennis* Malloch, 1927, from the Eastern Palaearctic and Oriental Regions, *S. taeniata* Hennig, 1956, from the Neotropics, and the Afrotropical species *S. biconspicua* Sabrosky, 1975, *S. trimaculata* Sabrosky, 1975, and *S. uniconspicua* Sabrosky, 1975.

*S. fascipennis* differs from all other species, including *S. soniae*, by the presence of a fourth whitish crossband near the distal margin of the wing and by the extremely short ultimate section of CuA1 which is much shorter than DM-Cu (in *S. soniae* at least 1.35 times as long, see Sueyoshi & Mathis, 2004, Fig. 2f). The 3 Afrotropical species all have a more extensive milky-whitish spot over DM-Cu which reaches dorsally at least R4+5, and all species have the ventral half of the anepisternum yellow, as well as entirely yellow femora (Sabrosky, 1975). In *S. soniae* the milky-white area is confined to a small surface around DM-Cu without reaching R4+5, the anepisternum is entirely grey, and the mid and hind femora have both a subapical brown to black ring. According to Hennig (1956), *S. taeniata* seems to have a rather similar wing pattern as *S. soniae*, but the wing base is more broadly whitish (only very narrowly in *S. soniae*), and the prescutellar dorsocentral seta is not separated by a gap from the penultimate seta (in *S. soniae* with a distinct gap). All dorsocentral setae except for the prescutellar dorsocentral seta are short in *S. taeniata*, whereas the last two dorsocentral setae are distinctly longer than the other dorsocentral setae in *S. soniae*.

Our knowledge of the genus is still preliminary. Probably less than 10% of the species that are stored in entomological collections are named. It is therefore premature to propose phylogenetic relationships. Moreover, no safely identified species outside the Western Palaearctic region were available for study. However, based on the comparison with other species of *Stenomicroa* it is reasonable to assume that *S. soniae*

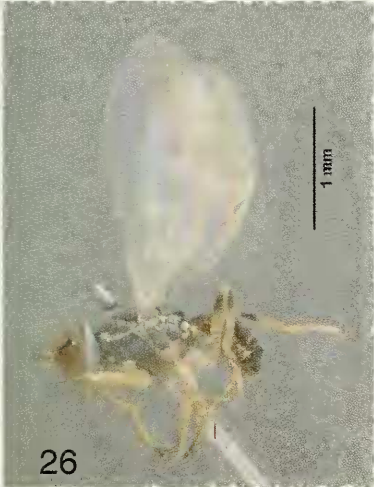




24



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27



28



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FIGS 24-29. Habitus photos of Western Palaearctic *Stenomicra*. 24, *S. delicata* (Collin), lateral view; 25, same, dorsal view; 26, *S. soniae* sp. n., lateral view; 27, same, dorsal view; 28, *S. cogani* Irwin, dorsal view; 29, *S. jordanensis* Freidberg & Mathis, lateral view. (Photos by A. Nobile, San Francisco).

may be more closely related to the 3 Afrotropical species based on wing pattern (Sabrosky, 1975, Figs 5-7) and general description than to *Stenomicra* (*Podocera*) from other biogeographical regions.

#### Subgenus *Stenomicra* Coquillett

*Stenomicra* Coquillett, 1900: 262.

#### *Stenomicra* (**s. str.**) *cogani* Irwin

Fig. 28

*Stenomicra cogani* Irwin, 1982: 235.

Material studied: **Germany**: 1 ♀, Nordrhein-Westfalen, Bielefeld-Nord, 2.VII.1999, M. v. Tschirnhaus (BUB); 1 ♂, Schleswig-Holstein, Kr. Plön, Lauker See, Kühren, 6.VI.1992, M. v. Tschirnhaus (BUB). **Italy**: 10 ♂♂, 3 ♀♀, Mantova pr., Marmirolo, Bosco d. Fontana, 50 m, 45.12N/10.45E, 25.V.2001, Merz & Mason (MHNG); **Spain (new record)**: 1 ♂, 3 ♀♀, Andalusia, Alcalá de los Gazules, 48km NNW Tarifa, road no 440, 6.IV.1993, M. v. Tschirnhaus (BUB).

In 1982, Irwin described and illustrated this species, including its external male terminalia, but no information was given about hypandrium and the aedeagal complex. The species is unique in the Western Palaearctic Region by its entirely yellow colour and the absence of the DM-Cu-crossvein (Fig. 28).

#### *Stenomicra* (**s. str.**) *jordanensis* Freidberg & Mathis

Fig. 29

*Stenomicra jordanensis* Freidberg & Mathis, 2002: 48.

Material studied: 1 ♂, 2 ♀♀, **Israel**: Park HaYarden, 14.IV.1999, A. Freidberg (TAU) (Paratypes).

An excellent description was provided by Freidberg & Mathis (2002). The terminalia of this species, however, were not studied. *S. jordanensis* can be distinguished from the other 3 Western Palaearctic species by the presence of vittae on the thorax (Fig. 29).

#### ACKNOWLEDGEMENTS

It is our pleasure to thank J. Ismay and B. Schulten (Oxford, England) for demonstrating the technique to collect small flies from grass tussocks and for unpublished data about the biology and distribution of *S. delicata*. We sincerely thank A. Freidberg (Tel Aviv, Israel) for loan of specimens and his help during the various stages of preparation of this paper, and to P. J. Chandler (Melksham, England) for literature and information about British species of *Stenomicra*. We are indebted to A. Pont and J. Hogan (Oxford, England) for loan of types of *S. delicata* and to G. Bächli (Zürich, Switzerland), M. Barták (Praha, Czech Republic), L. Papp (Budapest, Hungary), M. Sueysohi (Washington D. C., USA) and M. von Tschirnhaus (Bielefeld, Germany) for loan or donation of specimens. A. Nobile (California Academy of Sciences, San Francisco, USA) produced the photos of the colour plate, F. Marteau (Geneva) helped us with the preparation of the plates, Ch. Lienhard (Geneva) gave precious advice on nomenclatorial problems, and W. N. Mathis (Washington D. C., USA) kindly reviewed

the manuscript. Our thank is extended to the "Service des forêts, de la protection de la nature et du paysage" (G. Dändliker, Geneva) for the delivery of a collecting permit for Natural Reserves in the canton Geneva.

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